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Simulating the WFXT sky

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(Submitted on 29 Oct 2010)

We investigate the scientific impact of the Wide Field X-ray Telescope mission. We present simulated images and spectra of X-ray sources as observed from the three surveys planned for the nominal 5-year WFXT lifetime. The goal of these simulations is to provide WFXT images of the extragalactic sky in different energy bands based on accurate description of AGN populations, normal and star forming galaxies, groups and clusters of galaxies. The images are realized using a detailed PSF model, instrumental and physical backgrounds/foregrounds, accurate model of the effective area and the related vignetting effect. Thanks to this comprehensive modelization of the WFXT properties, the simulated images can be used to evaluate the flux limits for detection of point and extended sources, the effect of source confusion at very faint fluxes, and in general the efficiency of detection algorithms. We also simulate the spectra of the detected sources, in order to address specific science topics which are unique to WFXT. Among them, we focus on the characterization of the Intra Cluster Medium (ICM) of high-z clusters, and in particular on the measurement of the redshift from the ICM spectrum in order to build a cosmological sample of galaxy clusters. The end-to-end simulation procedure presented here, is a valuable tool in optimizing the mission design. Therefore, these simulations can be used to reliably characterize the WFXT discovery space and to verify the connection between mission requirements and scientific goals. Thanks to this effort, we can conclude on firm basis that an X-ray mission optimized for surveys like WFXT is necessary to bring X-ray astronomy at the level of the optical, IR, submm and radio wavebands as foreseen in the coming decade.

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